

1 We claim:

1 1. A portable carrier for a data storage medium, wherein said carrier is moveably
2 disposed in a data storage and retrieval system, comprising:

3 an enclosure having a first side;

4 a first permanent magnet disposed in said first side;

5 a guidepin disposed on said first side and extending outwardly therefrom;

6 wherein said guidepin includes a first groove.

1 2. The carrier of claim 1, wherein said guidepin has a conical shape.

1 3. The carrier of claim 1, wherein said guidepin has a cylindrical shape.

1 4. The carrier of claim 1, further comprising a second permanent magnet disposed in
2 said first side.

1 5. The carrier of claim 1, wherein said guidepin further includes a second groove.

1 6. The carrier of claim 1, further comprising a magnetic shield disposed within said
2 enclosure adjacent said first magnet.

1 7. The carrier of claim 6, further comprising a second side having a facing
2 relationship to said first side, wherein said second side includes an aperture.

1 8. The carrier of claim 7, further comprising a data storage medium, wherein said
2 magnetic shield is disposed between said first permanent magnet and said data storage medium.

1 9. The carrier of claim 8, further comprising a data drive unit disposed with said
2 enclosure, wherein said data storage medium is disposed in said data drive unit.

1 10. A portable carrier for a data storage medium, wherein said carrier is moveably
2 disposed with a data storage and retrieval system, comprising:

3 an enclosure having a first side;

4 a permanent magnet disposed in said first side;
5 a guidepin disposed on said first side and extending outwardly therefrom, wherein said
6 guidepin includes a groove;
7 a data drive unit disposed within said enclosure;
8 a data storage medium disposed within said data drive unit; and
9 a magnetic shield disposed between said permanent magnet and said data storage
10 medium.

1 11. An accessor moveably disposed in a data storage and retrieval system, wherein
2 said accessor includes a gripper mechanism comprising:
3 an electromagnet;
4 a fixturing assembly disposed adjacent said electromagnet, wherein said fixturing
5 assembly comprises:
6 a first solenoid;
7 a first member having a first end and a second end, wherein said first end of said first
8 member is slidingly connected to said first solenoid; and
9 a first fixturing blade attached to said second end of said first member.

1 12. The accessor of claim 11, wherein said fixturing assembly further comprises a
2 first retention spring disposed between said first solenoid and said first fixturing blade.

1 13. The accessor of claim 11, wherein said fixturing assembly further comprises:
2 a second solenoid;
3 a second member having a first end and a second end, wherein said first end of said
4 second member is slidingly connected to said second solenoid; and
5 a second fixturing blade attached to said second end of said second member.

1 14. The accessor of claim 13, wherein said fixturing assembly further comprises a
2 second retention spring disposed between said second solenoid and said second fixturing blade.

1 15. The accessor of claim 14, wherein said electromagnet comprises:
2 an elongated body having a first end and a second end;
3 a first arm having a first end and a second end, wherein said first end of said first arm is
4 disposed on said first end of said elongated body;
5 a second arm having a first end and a second end, wherein said first end of said second
6 arm is disposed on said second end of said elongated body.

1 16. The accessor of claim 15, wherein said fixturing assembly is disposed between
2 said first arm and said second arm.

1 17. The accessor of claim 16, further comprising a first coil wound around said first
2 arm.

1 18. The accessor of claim 17, further comprising a second coil wound around said
2 second arm.

1 19. An accessor moveably disposed in a data storage and retrieval system, wherein
2 said accessor includes a gripper mechanism comprising:

3 an electromagnet;

4 a fixturing assembly disposed adjacent said electromagnet, wherein said fixturing
5 assembly comprises:

6 an enclosure;

7 a first solenoid pivotably attached to said enclosure;

8 a first moveable member having a first end and a second end, wherein said first end of
9 said first member is slidingly connected to said first solenoid;

10 a circular plate rotatably disposed on said enclosure, wherein said second end of said first
11 member is pivotably connected to said circular plate, and wherein said circular plate includes an
12 aperture;

13 a first retention spring having a first end and a second end, wherein said first end of said
14 first retention spring is pivotably attached to said circular plate and wherein said second end of
15 said first retention spring is attached to said enclosure;

16 a plurality of moveable fixturing blades disposed within said enclosure;

17 a plurality of connecting rods, wherein one of said plurality of connecting rods is
18 disposed on, and extends outwardly from, each of said plurality of moveable fixturing blades;
19 wherein each of said plurality of connecting rods extends through said circular plate.

20. The accessor of claim 19, further comprising:

2 a second solenoid pivotably attached to said enclosure;

3 a second moveable member having a first end and a second end, wherein said first end of
4 said second member is slidably connected to said second solenoid, and wherein said second end
5 of said second member is pivotably attached to said circular plate; and

6 a second retention spring having a first end and a second end, wherein said first end of
7 said second retention spring is pivotably attached to said circular plate and wherein said second
8 end of said second retention spring is attached to said enclosure.

1 21. An accessor moveably disposed in a data storage and retrieval system, wherein
2 said accessor includes a gripper mechanism comprising:

3 an electromagnet;

4 a fixturing assembly disposed adjacent said electromagnet, wherein said fixturing
5 assembly comprises:

an enclosure;

a first motor disposed on said enclosure, wherein said first motor includes a first external shaft, wherein the distal end of said first external shaft extends outwardly from said motor;

a circular plate rotatably disposed on said enclosure, wherein said distal end of said first external shaft is slidingly connected to said circular plate, and wherein said circular plate includes an aperture;

a first retention spring having a first end and a second end, wherein said first end of said first retention spring is pivotably attached to said circular plate and wherein said second end of said first retention spring is attached to said enclosure;

a plurality of moveable fixturing blades disposed within said enclosure;

a plurality of connecting rods, wherein one of said plurality of connecting rods is disposed on, and extends outwardly from, each of said plurality of moveable fixturing blades; wherein each of said plurality of connecting rods extends through said circular plate.

22. The accessor of claim 21, further comprising:

a second motor disposed on said enclosure, wherein said second motor includes a second external shaft, wherein the distal end of said second external shaft extends outwardly from said motor, and wherein said distal end of said second external shaft is slidingly connected to said circular plate; and

a second retention spring having a first end and a second end, wherein said first end of said second retention spring is pivotably attached to said circular plate and wherein said second end of said second retention spring is attached to said enclosure.

23. A data storage and retrieval system comprising at least one accessor moveably disposed therein, wherein said accessor comprises:

an electromagnet;

a fixturing assembly disposed adjacent said electromagnet, wherein said fixturing assembly comprises:

a first solenoid;

a first moveable member having a first end and a second end, wherein said first end of said first moveable member is slidingly connected to said first solenoid; and

a first fixturing blade attached to said second end of said first moveable member.

24. The data storage and retrieval system of claim 23, wherein said fixturing assembly further comprises a first retention spring disposed between said first solenoid and said first fixturing blade.

25. The data storage and retrieval system of claim 24, wherein said fixturing assembly further comprises:

a second solenoid;

a second moveable member having a first end and a second end, wherein said first end of said second moveable member is slidingly connected to said second solenoid; and

a second fixturing blade attached to said second end of said second solenoid member.

26. The data storage and retrieval system of claim 25, wherein said fixturing assembly further comprises a second retention spring disposed between said second solenoid and said second fixturing blade.

27. The data storage and retrieval system of claim 26, wherein said electromagnet comprises:

an elongated body having a first end and a second end;

4 a first arm having a first end and a second end, wherein said first end of said first arm is
5 disposed on said first end of said elongated body;

6 a second arm having a first end and a second end, wherein said first end of said second
7 arm is disposed on said second end of said elongated body.

1 28. The data storage and retrieval system of claim 27, wherein said fixturing
2 assembly is disposed between said first arm and said second arm.

1 29. The data storage and retrieval system of claim 28, further comprising a first coil
2 wound around said first arm.

1 30. The data storage and retrieval system of claim 29, further comprising a second
2 coil wound around said second arm.

1 31. A data storage and retrieval system comprising at least one accessor moveably
2 disposed therein, wherein said accessor comprises:

3 an electromagnet;

4 a fixturing assembly disposed adjacent said electromagnet, wherein said fixturing
5 assembly comprises:

6 an enclosure;

7 a first solenoid pivotably attached to said enclosure;

8 a first moveable member having a first end and a second end, wherein said first end of
9 said first moveable member is slidingly connected to said first solenoid;

10 a circular plate rotatably disposed on said enclosure, wherein said second end of said first
11 moveable member is pivotably connected to said circular plate, and wherein said circular plate
12 includes an aperture;

13 a first retention spring having a first end and a second end, wherein said first end of said
14 first retention spring is pivotably attached to said circular plate and wherein said second end of
15 said first retention spring is attached to said enclosure;

16 a plurality of moveable fixturing blades disposed within said enclosure;

17 a plurality of connecting rods, wherein one of said plurality of connecting rods is
18 disposed on, and extends outwardly from, each of said plurality of moveable fixturing blades;

19 wherein each of said plurality of connecting rods extends through said circular plate.

1 32. The data storage and retrieval system of claim 31, wherein said accessor further
2 comprises:
3 a second solenoid;
4 a second moveable member having a first end and a second end, wherein said first end of
5 said second moveable member is slidingly connected to said second solenoid, and wherein said
6 second end of said second solenoid member is pivotably attached to said circular plate; and
7 a second retention spring having a first end and a second end, wherein said first end of
8 said second retention spring is pivotably attached to said circular plate and wherein said second
9 end of said second retention spring is attached to said enclosure.

1 33. A data storage and retrieval system comprising at least one accessor moveably
2 disposed therein, wherein said accessor comprises:

3 an electromagnet;

4 a fixturing assembly disposed adjacent said electromagnet, wherein said fixturing
5 assembly comprises:

6 an enclosure;

7 a first motor disposed on said enclosure, wherein said first motor includes a first external
8 shaft, wherein the distal end of said first external shaft extends outwardly from said motor;

9 a circular plate rotatably disposed on said enclosure, wherein said distal end of said first
10 external shaft is slidingly connected to said circular plate, and wherein said circular plate
11 includes an aperture;

12 a first retention spring having a first end and a second end, wherein said first end of said
13 first retention spring is pivotably attached to said circular plate and wherein said second end of
14 said first retention spring is attached to said enclosure;

15 a plurality of moveable fixturing members disposed within said enclosure;

16 a plurality of connecting rods, wherein one of said plurality of connecting rods is
17 disposed on, and extends outwardly from, each of said plurality of moveable fixturing blades;
18 wherein each of said plurality of connecting rods extends through said circular plate.

1 34. The data storage and retrieval system of claim 33, wherein said accessor further
2 comprises:

3 a second motor disposed on said enclosure, wherein said second motor includes a second
4 external shaft, wherein the distal end of said second external shaft extends outwardly from said
5 motor, and wherein said distal end of said second external shaft is slidingly connected to said
6 circular plate; and

7 a second retention spring having a first end and a second end, wherein said first end of
8 said second retention spring is pivotably attached to said circular plate and wherein said second
9 end of said second retention spring is attached to said enclosure.

1 35. A method to releaseably attach a portable carrier having a data storage medium
2 disposed therein to an accessor moveably disposed in a data storage and retrieval system,

3 wherein said accessor comprises an electromagnet, a first moveable fixturing blade slidingly
4 coupled to a first solenoid, and wherein said carrier comprises an enclosure having a first side, a
5 first permanent magnet disposed in said first side, a guidepin disposed on said first side, said
6 method comprising the steps of:

7 positioning said accessor adjacent said first side of said carrier;

8 retracting said first moveable fixturing blade;

9 energizing said electromagnet;

10 disposing said guidepin in said gripper mechanism;

11 extending said first moveable fixturing blade; and

12 deenergizing said electromagnet.

1 36. The method of claim 35, wherein said carrier further comprises a second
2 permanent magnet disposed in said first side.

1 37. The method of claim 35, wherein said retracting step further comprises the step of
2 energizing said first solenoid.

1 38. The method of claim 37, wherein said extending step further comprises the step of
2 deenergizing said first solenoid.

1 39. The method of claim 38, wherein said guidepin includes a first groove, said
2 method further comprising the step of inserting said first moveable fixturing blade into said first
3 groove.

1 40. The method of claim 39, wherein said guidepin further includes a second groove,
2 and wherein said accessor further includes a second fixturing blade slidingly coupled to a second
3 solenoid, said method further comprising the steps of:

4 energizing said second solenoid to retract said second fixturing blade;

5 deenergizing said second solenoid to extend said second fixturing blade; and
6 inserting said second fixturing blade in said second groove.

1 41. A method to retrieve, transport, and place a portable carrier having a data storage
2 medium disposed therein at designated destination within a data storage and retrieval system
3 using an accessor moveably disposed in said data storage and retrieval system, wherein said
4 accessor includes an electromagnet and a first moveable fixturing blade, and wherein said carrier
5 comprises an enclosure having a first side, a permanent magnet disposed in said first side, and a
6 guidepin disposed on said first side, wherein said guidepin includes a first groove, said method
7 comprising the steps of:

- 8 (a) positioning said accessor adjacent said first side of said carrier;
9 (b) retracting said first fixturing blade;
10 (c) energizing said electromagnet such that said electromagnet has a first polarity;
11 (d) inserting said guidepin in said gripper mechanism;
12 (e) extending said first fixturing blade;
13 (f) deenergizing said electromagnet;
14 (g) moving said accessor;
15 (h) positioning said accessor adjacent said designated destination;
16 (i) retracting said first fixturing blade;
17 (j) energizing said electromagnet such that said electromagnet has a second polarity;
18 (k) placing said carrier at said designated destination; and
19 (l) deenergizing said electromagnet.

1 42. The method of claim 41, wherein said accessor further comprises a first solenoid
2 coupled to said moveable first fixturing blade, wherein steps (b) and (i) further comprise the step
3 of energizing said first solenoid, and wherein said step (e) further comprises the steps of:
4 deenergizing said first solenoid; and
5 inserting said first fixturing blade into said first groove.

1 43. The method of claim 42, wherein said guidepin includes a second groove and
2 wherein accessor further comprises a second moveable fixturing blade, wherein steps (b) and (i)
3 further includes the step of retracting said second moveable fixturing blade, and wherein step (e)
4 further includes the step of extending said second moveable fixturing blade.

1 44. The method of claim 43, wherein said accessor further includes a second solenoid
2 coupled to said second fixturing blade, wherein steps (b) and (i) further comprise the step of
3 energizing said second solenoid, and wherein said step (e) further comprises the steps of:
4 deenergizing said second solenoid; and
5 inserting said second moveable fixturing blade into said second groove.

1 45. The method of claim 41, wherein said accessor further comprises a first motor and
2 a first shaft, wherein said first shaft is connected to said first motor and to said first moveable
3 fixturing blade, wherein steps (b) and (i) further comprise the step of energizing said first motor,
4 and wherein said step (e) further comprises the steps of:
5 deenergizing said first motor; and
6 inserting said first moveable fixturing blade into said first groove.

1 46. The method of claim 45, wherein said guidepin includes a second groove and
2 wherein said accessor further comprises a second moveable fixturing blade, wherein steps (b)

3 and (i) further includes the step of retracting said second moveable fixturing blade, and wherein
4 step (e) further includes the step of extending said second moveable fixturing blade.

1 47. The method of claim 46, wherein said accessor further includes a second motor
2 and a second shaft, wherein said second shaft is connected to said motor and to said second
3 moveable fixturing blade, wherein steps (b) and (i) further comprise the step of energizing said
4 second motor, and wherein said step (e) further comprises the steps of:

5 deenergizing said second motor; and

6 inserting said second moveable fixturing blade into said second groove.

1 48. A data storage and retrieval system comprising a computer useable medium
2 having computer readable program code disposed therein for releaseably attaching a carrier
3 having a data storage medium disposed therein to an accessor moveably disposed in a data
4 storage and retrieval system, wherein said accessor comprises an electromagnet, a first solenoid
5 coupled to a first moveable fixturing blade, and wherein said carrier comprises an enclosure
6 having a first side and a permanent magnet disposed in said first side, the computer readable
7 program code comprising a series of computer readable program steps to effect:

8 positioning said accessor adjacent said first side of said carrier;

9 energizing said first solenoid;

10 energizing said electromagnet;

11 deenergizing said first solenoid; and

12 deenergizing said electromagnet.

1 49. The data storage and retrieval system of claim 48, wherein said accessor further
2 includes a second solenoid having a second moveable fixturing blade coupled thereto, wherein
3 said computer readable program code to effect energizing said first solenoid further comprises a

4 series of computer readable program steps to effect energizing said second solenoid, wherein
5 said computer readable program code to effect deenergizing said first solenoid further comprises
6 a series of computer readable program steps to effect deenergizing said second solenoid.

1 50. A data storage and retrieval system comprising a computer useable medium
2 having computer readable program code disposed therein for releaseably attaching a carrier
3 having a data storage medium disposed therein to an accessor moveably disposed in a data
4 storage and retrieval system, wherein said accessor comprises an electromagnet, a first motor
5 coupled to a first moveable fixturing blade, and wherein said carrier comprises an enclosure
6 having a first side and a permanent magnet disposed in said first side, the computer readable
7 program code comprising a series of computer readable program steps to effect:

8 positioning said accessor adjacent said first side of said carrier;

9 energizing said first motor;

10 energizing said electromagnet;

11 deenergizing said first motor; and

12 deenergizing said electromagnet.

1 51. The data storage and retrieval system of claim 50, wherein said accessor further
2 includes a second motor having a second moveable fixturing blade coupled thereto, wherein said
3 computer readable program code to effect energizing said first motor further comprises a series
4 of computer readable program steps to effect energizing said second motor, and wherein said
5 computer readable program code to effect deenergizing said first motor further comprises a
6 series of computer readable program steps to effect deenergizing said second motor.

1 52. A data storage and retrieval system comprising a computer useable medium
2 having computer readable program code disposed therein for retrieving, transporting, and placing

3 a carrier having a data storage medium disposed therein at a designated destination disposed in a
4 data storage and retrieval system using an accessor moveably disposed in said data storage and
5 retrieval system, wherein said accessor comprises an electromagnet, a first solenoid coupled to a
6 first moveable fixturing blade, and wherein said carrier comprises an enclosure having a first
7 side and a permanent magnet disposed in said first side, the computer readable program code
8 comprising a series of computer readable program steps to effect:

9 positioning said accessor adjacent said first side of said carrier;

10 energizing said first solenoid;

11 energizing said electromagnet such that said electromagnet has a first polarity;

12 deenergizing said first solenoid;

13 deenergizing said electromagnet;

14 moving said accessor;

15 positioning said accessor adjacent said designated destination;

16 energizing said first solenoid;

17 energizing said electromagnet such that said electromagnet has a second polarity;

18 placing said carrier at said designated destination; and

19 deenergizing said electromagnet.

1 53. The data storage and retrieval system of claim 52, further comprises a second
2 solenoid coupled to a second moveable fixturing blade, wherein said computer readable program
3 code to effect energizing said first solenoid further comprises a series of computer readable
4 program steps to effect energizing said second solenoid, and wherein said computer readable
5 program code to effect deenergizing said first solenoid further comprises a series of computer
6 readable program steps to effect deenergizing said second solenoid.

1 54. A data storage and retrieval system comprising a computer useable medium
2 having computer readable program code disposed therein for retrieving, transporting, and placing
3 a carrier having a data storage medium disposed therein at a designated destination disposed in a
4 data storage and retrieval system using an accessor moveably disposed in said data storage and
5 retrieval system, wherein said accessor comprises an electromagnet, a first motor coupled to a
6 first moveable fixturing blade, and wherein said carrier comprises an enclosure having a first
7 side and a permanent magnet disposed in said first side, the computer readable program code
8 comprising a series of computer readable program steps to effect:

9 positioning said accessor adjacent said first side of said carrier;

10 energizing said first motor;

11 energizing said electromagnet such that said electromagnet has a first polarity;

12 deenergizing said first motor;

13 deenergizing said electromagnet;

14 moving said accessor;

15 positioning said accessor adjacent said designated destination;

16 energizing said first motor;

17 energizing said electromagnet such that said electromagnet has a second polarity;

18 placing said carrier at said designated destination; and

19 deenergizing said electromagnet.

1 55. The data storage and retrieval system of claim 54, further comprises a second
2 motor coupled to a second moveable fixturing blade, wherein said computer readable program
3 code to effect energizing said first motor further comprises a series of computer readable
4 program steps to effect energizing said second motor, and wherein said computer readable

- 5 program code to effect deenergizing said first motor further comprises a series of computer
- 6 readable program steps to effect deenergizing said second motor.

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